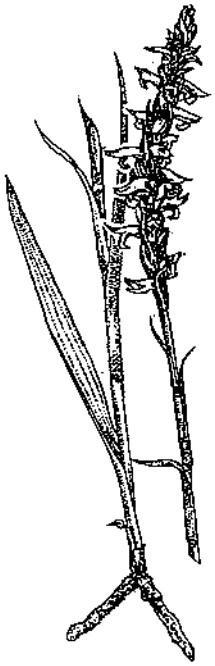


Ute Ladies Tresses (*spiranthes diluvialis*) in Idaho: 1997 and 1998 Status Reports

by Robert Mosley
Conservation Data Center

UTE LADIES TRESSES (*SPIRANTHES DILUVIALIS*) IN IDAHO:

1997 STATUS REPORT

by

Robert K. Moseley
Conservation Data Center

April 1998

Idaho Department of Fish and Game
Natural Resource Policy Bureau
600 South Walnut, P.O. Box 25
Boise, Idaho 83707
Stephen P. Mealey, Director

Status Survey Report prepared for
Idaho Department of Parks and Recreation
through Section 6 funding from
U.S. Fish and Wildlife Service, Region 1

ABSTRACT

Ute ladies tresses (*Spiranthes diluvialis*) is a white-flowered orchid that occurs in low elevation wetlands and riparian zones of the Central and Northern Rockies and adjacent plains and valleys. The specific epithet, *diluvialis*, is Latin meaning "of the flood," which is descriptive of much of the species' habitat: alluvial substrates along perennial streams and rivers. It was listed as Threatened under the Endangered Species Act in 1992. At the time of listing it was known to be extant in Colorado and Utah, with one historical population in Nevada. It was listed due to its rarity, low population sizes, and threats of loss or modification of riparian habitats. Since listing Ute ladies tresses populations have been discovered in Nebraska, Wyoming, Idaho, Montana, and Washington.

In this report I summarize our knowledge of the status of Ute ladies tresses in Idaho, through the 1997 field season. Results from the 1996 season were reported last year (Moseley 1997a). Topics covered by this report include a review of the taxonomy, species description and identification aids, the rangewide and Idaho distributions, extent of surveys in Idaho, habitat characteristics, aids in assessing potential habitat, and floodplain dynamics in relation to Ute ladies tresses habitat. I also briefly review the population biology, land ownership and land use, as well as possible threats to the species in Idaho.

My assessment of the Idaho populations is that all have existing and potential threats and are vulnerable. Flow regime alteration by Palisades Dam represents the most significant long-term threat to species viability in the Snake River metapopulation, while cattle grazing represents the most significant short-term threat. I believe flow alteration to be the greater threat of the two.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

TAXONOMY

Full bibliographic citation: Sheviak, C.J. 1984. *Spiranthes diluvialis* (Orchidaceae), a new species from the western United States. Brittonia 36(1):8-14.

Type specimen: U.S.A., Colorado, Jefferson County: mesic to wet alluvial meadows along Clear Creek just west of junction of routes 6 and 58, Golden, 17 July 1982, *C.J. Sheviak, J. K. Sheviak, W. Jennings, L. Long, and S. Smookler 2257* (Holotype: NYS; Isotype: NY).

Pertinent synonym(s): *Spiranthes romanzoffiana* var. *diluvialis* (Welsh et al. 1993). See also History of Knowledge of Taxon section, below.

Common name: Ute ladies tresses.

Size of genus: About 40 species, most American, but also in Japan, Australia, and New Zealand (Wilkens and Jennings 1993).

Family name: Orchidaceae.

Common name for family: Orchid.

History of knowledge of taxon: Prior to the description of *Spiranthes diluvialis* in 1984 (Sheviak 1984), workers in Orchidaceae had tried to accommodate *Spiranthes* specimens from low elevations in Colorado and Utah in the three taxa listed below. All these specimens are now known to be from historical or current populations of *S. diluvialis* (England 1992).

- *Spiranthes cernua* (Correll 1950; Holmgren 1977; Arnow et al. 1980; Welsh et al. 1987).
- *Spiranthes porrifolia* or *S. romanzoffiana* var. *porrifolia* (Rydberg 1906; Correll 1950; Holmgren 1977; Goodrich and Neese 1986; Welsh et al. 1987).
- *Spiranthes magnicamporum* (Lauer 1975).

At the time of listing as Threatened under the Endangered Species Act in 1992 (England 1992), Ute ladies tresses was known from Colorado, Utah, and extreme eastern Nevada. Several of these populations were known to have been extirpated. New populations have since been discovered in other portions of Utah and Colorado (Ute Ladies Tresses Recovery Team 1995), as well as eastern Wyoming in 1993 (Fertig 1994), Montana in 1994 (Heidel 1997), Nebraska in 1996 (Hazlett 1996), Idaho in 1996 (Moseley 1997a), and Washington in 1997 (Heidel 1998; U.S. Fish and Wildlife Service 1998).

In addition to the morphological data used by Sheviak (Sheviak 1984) to distinguish Ute ladies tresses as a distinct species, Arft (1995) found that it's distinctiveness is also supported by genetic

data. These genetic studies also corroborate Sheviak's hypothesis that Ute ladies tresses is a polyploid derived from the hybridization of the diploids, *Spiranthes magnicamporum* and *S. romanzoffiana.*

Alternative taxonomic treatments: In their first edition of *A Utah Flora* Welsh et al. (1987) synonomized *Spiranthes diluvialis* with *S. porrifolia*, a species that is now considered not to occur in Utah. They later treated it as a *S. romanzoffiana* var. *diluvialis* in the current edition (Welsh et al. 1993).

LEGAL OR OTHER FORMAL STATUS

International:

Convention on the International Trade in Endangered Species (CITES): As a member of the Orchid Family (Orchidaceae), Ute ladies tresses is included on the CITES Appendix II list. Species listed in Appendix II require a permit from the country of origin to export. International trade in this species has not been documented (Heidel 1997).

Heritage Network Conservation Rank: The international network of Natural Heritage Programs and Conservation Data Centers currently ranks Ute ladies tresses as "globally imperiled" or "G2" owing to extreme rarity. This indicates generally 20 or fewer occurrences, conditioned by quality, condition, viability, and vulnerability of the occurrences (Heidel 1997).

National:

Endangered Species Act of 1973: Ute ladies tresses is listed as Threatened under the Endangered Species Act and its recovery is administered by the U.S. Fish and Wildlife Service (England 1992). A draft Recovery Plan (Ute Ladies Tresses Recovery Team 1995) and Section 7 consultation recommendations and guidelines (U.S. Fish and Wildlife Service 1995; 1998) have been prepared.

Federal Agencies: Federal agencies are required to recognize protected species under the Endangered Species Act and implement applicable recovery actions.

Heritage Network Conservation Rank: Ute ladies tresses is known only from the United States, but the Washington population is close to the border with British Columbia, Canada. So, curently the only National or "N" rank is for the the United States, where it is the same as the Global rank, that is, "N2." If it is found in Canada, it will also be assigned a National Rank for that country.

State (Idaho):

Idaho Conservation Data Center: As the state node of the Natural Heritage network, the Conservation Data Center (CDC) recognizes it as "state imperiled" or "S2" in Idaho. This rank is not a legal designation and it does not afford it legal protection or regulation.

Idaho Native Plant Society: It is recognized as a "Global Priority 2" species (Idaho Native Plant Society 1998). This rank is not a legal designation and it does not afford it legal protection or regulation.

DESCRIPTION AND IDENTIFICATION

General description: Ute ladies tresses is a perennial orchid with one and sometimes multiple stems 12-50 cm tall, arising from tuberously thickened roots. Its narrow, 1-cm wide leaves can reach 28 cm long, with the longest leaves being at the base of the stem. Leaves persist during flowering. The inflorescence consists of a few to many white or ivory flowers clustered in a spike of 3-ranked spirals at the top of the stem. The sepals and petals are oriented perpendicular to the stem, the lateral sepals often spreading abruptly from the base of the flower, and all sepals are free to the base. The lip petal is somewhat constricted in the middle (Heidel 1997, adapted from Ute Ladies Tresses Recovery Team 1995).

Technical description: Herb, erect, slender to stout, 20-50 cm tall, glabrous below, pubescent above with numerous capitate trichomes. *Roots* tuberously thickened, up to 1 cm in diameter. *Leaves* linear-lanceolate, the larger to 28 x 1.5 cm, basal usually restricted to the very base of the stem and rapidly reduced upward to sheathing bracts, persisting past anthesis. *Spike* dense, 3-5 x 1.2-2.5 cm. *Floral bracts* ovate, attenuate or acuminate, the lower 9-33 mm long. *Flowers* 7.5-15 mm long, faintly fragrant with the scent of coumarin, white or ivory, the lip often yellow centrally. *Sepals* free or connate at the base, the dorsal lanceolate, acute, the lateral broadly spreading to loosely incurved or appressed, linear-lanceolate, acuminate. *Petals* connivent with the dorsal sepal, linear, acuminate. *Lip* 7-12 x 2.5-6.8 mm, ovate, lanceolate, or oblong, with a median constriction and occasionally pandurate, the margin entire or dentate toward the apex, crisped, the basal calli prominent, pubescent. *Seeds* ellipsoidal, monoembryonic (Sheviak 1984).

Local field characters and identification aids for Idaho: Prior to the discovery of *Spiranthes diluvialis* (Ute ladies tresses) along the Snake River in 1996, the Idaho flora was thought to contain only one member of the genus, *S. romanzoffiana* (hooded ladies tresses). Recently, however, a *Spiranthes* specimen collected in 1996 on BLM land in Hells Canyon was identified as *S. porrifolia* (Sheviak 1998). This is the only known population of *S. porrifolia* (western ladies tresses) in Idaho (Sheviak 1998). The three species of *Spiranthes* in Idaho are not known to occur with each other and, in general, this holds true rangewide. There is one known exception, however, at a 6,800-foot site in northern Utah where *S. diluvialis* and *S. romanzoffiana* occur in a mixed population (U.S. Fish and Wildlife Service 1998). Below are some aids based on plant

morphology and major life zone habitat that may be useful in telling the three *Spiranthes* species apart in Idaho.

Spiranthes diluvialis is characterized by whitish, stout, ringent (gaping at the mouth) flowers, with slender, elongate petals and sepals that are white to ivory-colored and free to the base. The lip is exposed in lateral view, with an oval to lance or oblong outline, a marked median constriction, the base usually dilated, the venation mostly parallel, typically with some divaricate branching in the lower half, and with crispy-wavy margins. The upper stem is sparsely to densely pubescent, the longest hairs are longer than 0.2 mm, and the glands are obviously stalked. The persistent leaves are mostly restricted to the base of the stem, reduced to bracts above (Heidel 1997, adapted from Ute Ladies Tresses Recovery Team 1995, and Wyoming Technical Plant Committee 1995).

By comparison *Spiranthes romanzoffiana* has connate sepals which usually curve in the shape of a hood on top. It has a more deeply constricted lip petal (pandurate or violin-shaped) and generally more densely congested and shorter spikes compared to *S. diluvialis*. Its leaves often extend up the lower stem.

The field characters of *Spiranthes porrifolia* include yellowish, very slenderly tubular flowers with marked fusion of the lateral sepals below the tip, spreading sepal apices (no hood formed), virtual lack of apical dilation of the lip (not violin-shaped) and a dense cushion of short, peg-like projections (sometimes referred to as callosites) on the upper surface of the apical segment of the lip, just behind the apex. The diagnostic feature of *S. porrifolia* are the callosites on the apical segment of the lip. This feature is never present in *S. romanzoffiana* (Sheviak 1998), which has a glabrous lip, and apparently not in *S. diluvialis*, although basal (as opposed to apical) calli are prominent on the lip, which is also pubescent. (Sheviak 1984)

I have never seen *Spiranthes porrifolia*, but in my experience with the other two species in Idaho, Ute ladies tresses is generally a more robust plant in every respect: taller, larger leaves, bigger flowers, etc. This is not surprising given that Ute ladies tresses is a polyploid, in part, derived from hooded ladies tresses (Sheviak 1984; Arft 1994; 1995); relative gigantism is one of the characteristics of a polyploid.

Table 1 presents my attempt at a key for the three species in Idaho, while Table 2 presents a conspectus of diagnostic features. I would appreciate receiving input and refinements on this key and conspectus based on field experience in Idaho. Figure 1 presents line drawings of the three species.

An orchid species with similar vegetative features, *Habenaria hyperborea* (northern green bog orchid), grows with Ute ladies tresses along the South Fork Snake River and occurs in potential habitat elsewhere in eastern and central Idaho (e.g., Mancuso 1997). [NOTE: last year (Moseley 1997a), based on vegetative material, I misidentified this as *H. dilatata* (white bog orchid).] Northern green bog orchid has small green flowers that usually reach anthesis much earlier than

Table 1. Diagnostic key to the three *Spiranthes* species in Idaho.

1. Lateral sepals free or only slightly connate at the base; rachis of inflorescence with at least some hairs more than 0.2 mm long; plants found at or below lower timberline in the foothills and plains ..... *S. diluvialis*

1. Lateral sepals strongly connate; rachis of inflorescence glabrous or with very short glandular hairs, mainly less than 0.1 mm long; plants at various elevations.

   2. Lip lanceolate to more or less ovate, tip with dense cushion of short, peg-like projections above; flowers slenderly tubular, generally yellowish; plants found in woodlands near lower timberline..... *S. porrifolia*

   2. Lip more or less violin-shaped, tip glabrous; flowers with curved tubular hood, generally white; plants found in montane and subalpine forest zones between upper and lower timberline, mesic grasslands, rarely in alkaline fens below lower timberline..... *S. romanzoffiana*

Ute ladies tresses, mostly in late June and July. The stem, leaves, and fruits of the bog orchid are often dried and brown at the same time that the ladies tresses was in full flower and early fruit (fruits still green). Northern green bog orchid is two-to-three times larger in size (height, stem thickness, inflorescence, leaves, etc.), with more leaves occurring higher on the stem and many more flowers in the inflorescence. This species appears to be a good indicator of Ute ladies tresses habitat along the South Fork, at least. Although possibly having a slightly wider ecological amplitude, it seems to be restricted to the moist, wetland-upland transition that is dominated by the grass, *Agrostis stolonifera*. It proved to be a useful indicator of potential habitat along the South Fork and elsewhere in Idaho.

DISTRIBUTION

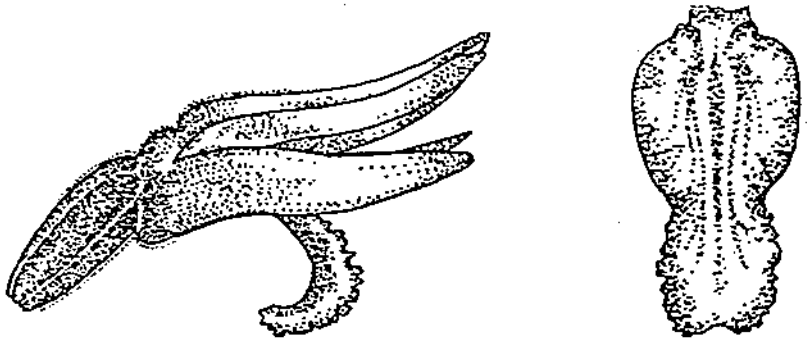
Rangewide distribution: The global range of Ute ladies tresses extends from the Great Plains of western Nebraska and adjacent Wyoming, west for about 600 miles across the Rocky Mountain and Intermountain regions to the Okanogan Valley of north-central Washington. The northernmost population in the Okanogan Valley is very close to the British Columbia border, and the distribution extends south for about 550 miles into the Great Basin of southeastern Nevada and plateaus of southern Utah. It is highly discontinuous within this area. It is known to be extant in seven states (Colorado, Utah, Nebraska, Wyoming, Idaho, Montana, and Washington). The Nevada collection from 1936 has not been relocated. The rangewide distribution is presented in Figure 2, which was prepared by Ron Hartman (1997).

Table 2. Comparison of diagnostic features of *Spiranthes diluvialis*, *S. romanzoffiana*, and *S. porrifolia*.

Character	*S. diluvialis*	*S. romanzoffiana*	*S. porrifolia*
Leaves	Several, mostly at base of stem, persistent.	Often numerous, sometimes extending up the lower stem, persistent.	Similar to *S. romanzoffiana*.
Rachis	Sparsely to densely pubescent, the longest hairs ≥ 0.19 mm (often much longer), the glands obviously stalked.	Glabrous or sparsely pubescent, the longest hairs <0.18 mm long (usually much less), the glands often sessile or subsessile.	Similar to *S. romanzoffiana*.
Flowers	Ascending, rather long and slender, whitish to ivory-colored, ringent (gaping at the mouth); lip exposed in lateral view.	Strongly ascending, short, broad at base, white to cream, well-developed hood open only at the apex (not ringent); lip hidden in lateral view except for reflexed tip.	Very slenderly tubular, ventrally curved, yellowish, open only at the apex (not ringent), lip hidden in lateral view except for reflexed tip.
Sepals	Often connate at base for a short distance, sometimes free; variably appressed, spreading, or ascending; hood rarely evident.	Fused for some length, generally >1/2, and united with the petals to form a prominent hood above the lip.	Fused for some length forming a slender tube, and joined with the petals, appressed for most of their length but widely spreading toward the apices (no hood formed).
Lip	Ovate to lanceolate or oblong in outline, with a marked median constriction, the base usually dilated; lacking a dense cushion of short hairs on upper surface near apex; membranous when moist; venation mostly parallel, typically with some branching divaricating veins in lower half, often elongated.	Strongly pandurate (violin-shaped with marked median constriction) the apex dilated; glabrous on upper surface; membranous when moist; prominently veined below the constriction with laterally diverging, branched veins.	Ovate to lanceolate in outline, ± acute, the apex only slightly or not at all dilated, dense cushion of short, peg-like projections on the upper surface of the apical segment of the lip just behind the apex, membranous when moist.
Chromosome	$2n = 74$	Commonly $2n = 44$	$2n = 44, 66, 88$
Flowering Period in Idaho	Late August through mid-September; rarely late September and early October.	Variable but typically mid-July; late June at low elev. in N ID; fruits dehiscing when *S. diluvialis* is in prime flower.	Idaho specimen in full flower when collected 14 August 1996.
Major Life Zones in Idaho	Sagebrush-steppe to transition zone with montane forest (lower timberline).	Montane and subalpine coniferous forests, aspen; rarely alkaline fens in high-elevation sagebrush-steppe; steppe in N ID.	One known population at 5,000' in seep in Douglas-fir stand at lower timberline near transition to fescue grasslands (lower timberline).

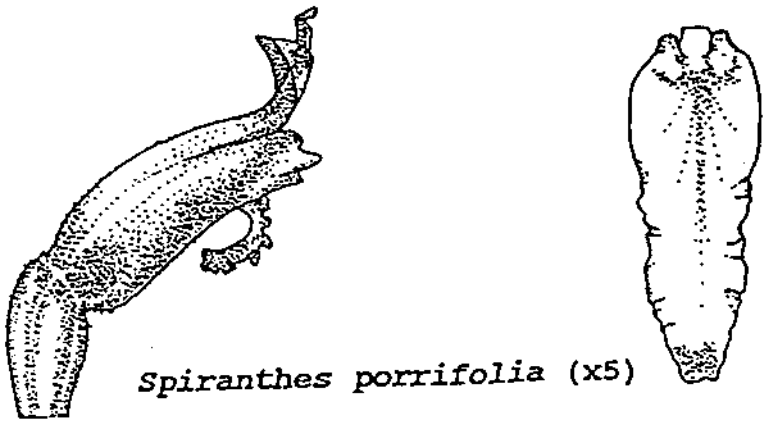
Figure 1. Line drawings of *Spiranthes diluvialis*, *S. romanzoffiana*, and *S. porrifolia*; A. flowers. B. habit. Illustrations are by Carolyn Crawford.

Figure 1A



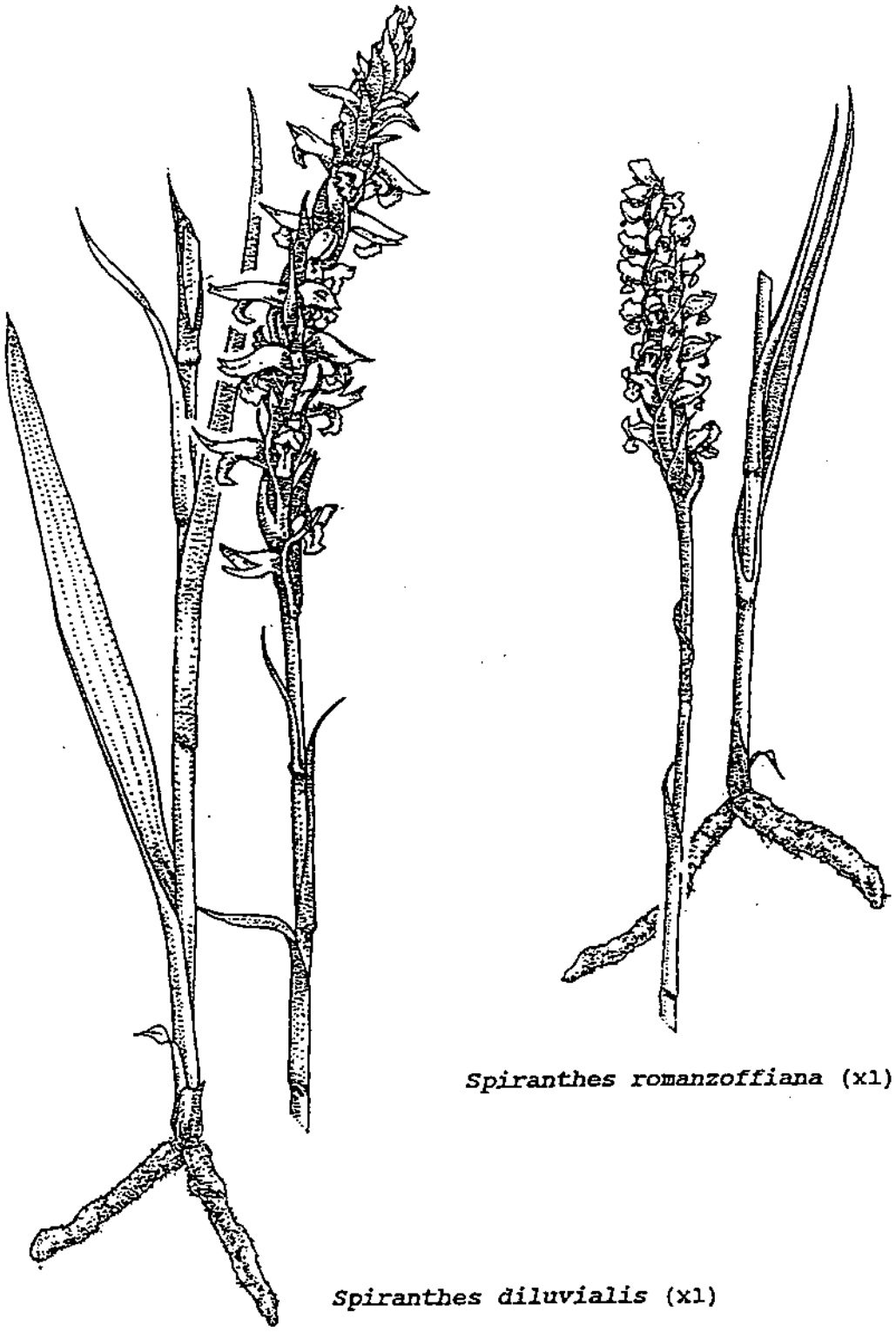
Spiranthes diluvialis (x5)

Spiranthes romanzoffiana (x5)



Spiranthes porrifolia (x5)

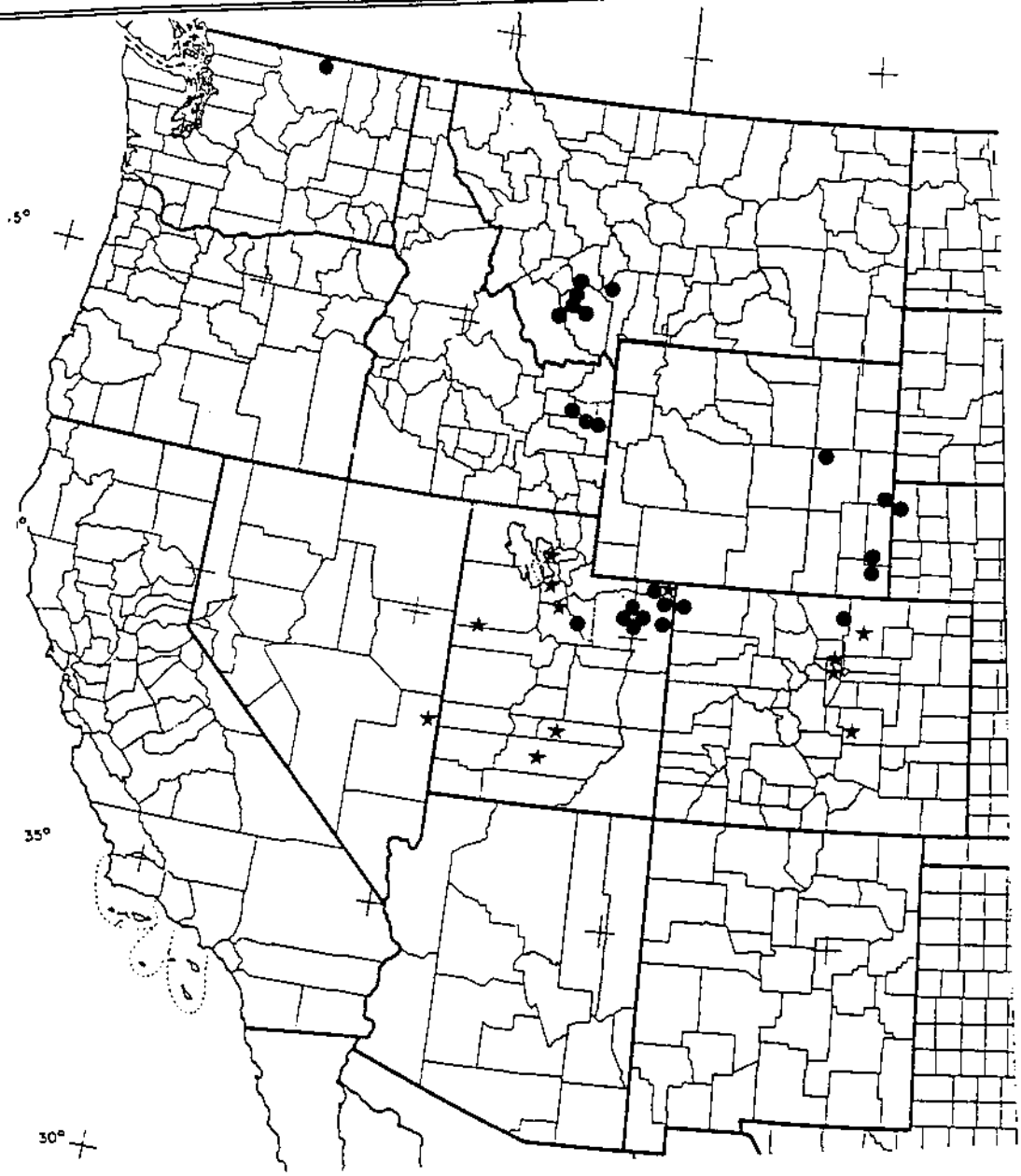
Figure 1B



Spiranthes romanzoffiana (x1)

Spiranthes diluvialis (x1)

Figure 2. Rangewide distribution of *Spiranthes diluvialis*, prepared by Ron Hartman (1997).



Spiranthes diluvialis -- Ute ladies'-tresses

● = populations discovered in the past 5 years, including ones from ID, MT, NE, WA, and WY.

★ = populations discovered earlier, all have been relocated except the one in NV.

Idaho distribution: In Idaho, Ute ladies tresses is known from the Snake River floodplain in the far eastern part of the state, in Jefferson, Madison and Bonneville counties (Figure 3). Populations are scattered along 49 river miles from near the confluence of the Henry's Fork, upstream to Swan Valley, nine river miles below Palisades Dam. In Idaho, this stretch of river is known locally as the "South Fork;" on USGS maps and in Wyoming the same waterway is known simply as the Snake River.

Precise occurrences in Idaho: I consider the populations along the Snake River to be one large metapopulation, although 20 occurrences have been delineated in the CDC data base based on management and geographic considerations. The precise occurrences for Idaho have been compiled and distributed in other reports (Moseley 1997a; 1997b; 1997c; 1997d), so I will only present a summary here (Table 3). Refer to the other reports for detailed location data for individual Idaho occurrences.

Historical sites in Idaho: None.

Unverified/undocumented reports in Idaho: None.

Extent of surveys in Idaho: In 1995, the Section 7 (ESA) consultation guidelines for Ute ladies tresses identified Priority Survey Areas for states containing populations, as well as adjacent states known to have potential habitat (U.S. Fish and Wildlife Service 1995). In Idaho, the Bear River drainage and the Snake River above American Falls Reservoir were identified as Category 3 watersheds, where surveys were encouraged, although populations were not known to occur. Beginning in late July 1996, biologists from the CDC began to conduct extensive searches throughout these watersheds for Ute ladies tresses. These 1996 inventories are summarized in Moseley (1997a) and Moseley (1997c).

After its discovery on the Snake River in August 1996, the Section 7 consultation area was expanded to include 24 counties in eastern and east-central Idaho. During 1997, federal and state agencies from throughout the consultation area were active in conducting intensive, project-specific inventories, as well as extensive, systematic surveys of potential habitat. The CDC has compiled all known survey routes on a set of 1:100,000-scale maps. Our conservative estimate is that at least 515 miles of streams and rivers in the consultation area have been surveyed specifically for Ute ladies tresses in 1996 and 1997. Ute ladies tresses was discovered along about 10% of this riparian mileage, along one contiguous segment of the Snake River.

Figure 3. Distribution of *Spiranthes diluvialis* in Idaho.

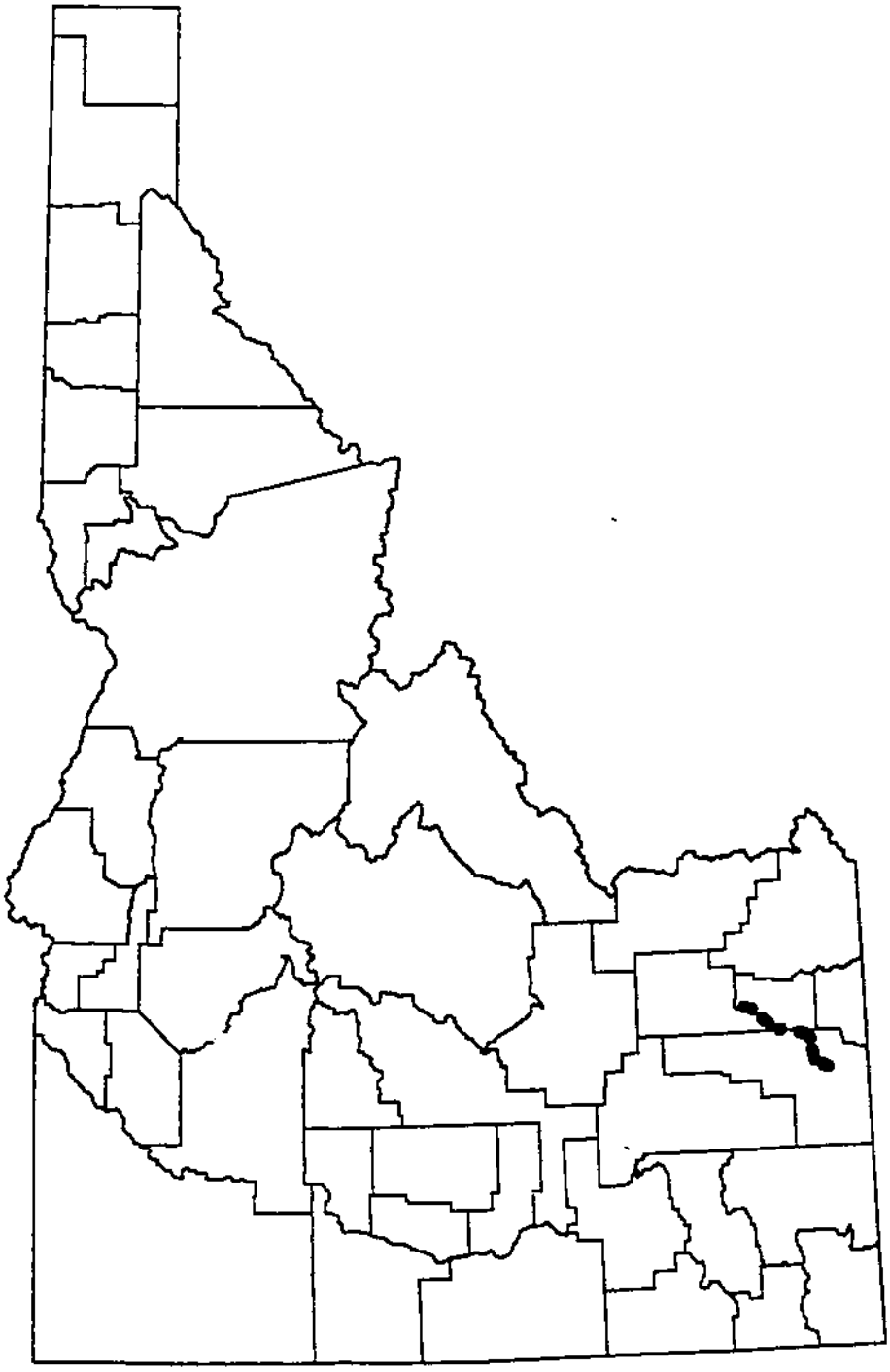


Table 3. Ute ladies tresses occurrences in Idaho, arranged by river mile along the Snake River.

Occurrence Name	Occurrence No.	River Mile[1]	Land Ownership
Annis Island	006	835	BLM
Lorenzo Levee	008	836.5	Private
Archer Powerline	015	844	Private
Twin Bridges Island	007	848	BLM, County
Railroad Island	005	847	BLM
Kelly's Island	001	853	BLM
Mud Creek Bar	009	862	BLM
Rattlesnake Point	002	863.5	BLM
TNC Island	010	863.5	BLM
Warm Springs Bottom	003	866*	BLM
Lufkin Bottom	011	867*	BLM
Gormer Canyon #5	012	867.8*	Targhee NF
Gormer Canyon #4	013	868.5*	Targhee NF
Pine Creek #5	014	873.5*	BLM
Pine Creek #3 & #4	016	874.5*	BLM
Lower Conant Valley	017	876.3*	BLM
Upper Conant Valley	018	878*	BLM
Lower Swan Valley	019	881.8*	BLM
Falls Campground	004	882*	Targhee NF
Squaw Creek Islands	020	884*	BLM, Private

[1]In some cases the river miles reported on the USGS quads are incorrect. I use the remeasured river mile index of the Hydrology and Hydraulics Committee (1976) as the reference for this table and subsequent discussions. Cases where the remeasurement disagrees with the quad are marked with an asterisk (*).

Below are the surveys and surveyors on records at the CDC, the general area of inventory, and the dates they were performed.

- Bob Moseley (1997a) and others - throughout eastern Idaho, July - September 1996.
- Steve Popovich - proposed Boulder Mountain Trail route, Big Wood River valley, August 1996.
- Michael Mancuso (1997) - Salmon and Challis National Forests, August and September 1997.
- Michael Mancuso (1998) - The Nature Conservancy's Flat Ranch Preserve, July 1997 (found *Spiranthes romanzoffiana*).
- Bob Moseley and others - wetlands in Monida Pass area, July 1997 (found *Spiranthes romanzoffiana*).
- Bob Moseley (1997c; 1997d) and many others - Snake River corridor and other selected areas in eastern Idaho, August - October 1997.
- Bob Moseley (1997e) and others - Bonneville Power Administration fish hatchery sites around Fort Hall, August 1997.
- Bob Moseley and Michael Mancuso (1997) - 13 proposed Idaho Transportation Department (ITD) bridge projects in east-central and eastern Idaho, August - September 1997.
- Bob Moseley (1997f) - proposed Idaho Transportation Department (ITD) road projects near Soda Springs and Montpelier, September 1997.
- Mabel Jankovsky-Jones and Michael Mancuso - numerous wetlands and riparian areas in the valleys of east-central Idaho.
- Rose Lehman - Snake River Ranger Station and other areas on the Snake, August - September 1997.
- Jim Glennon (1997) and others - BLM Pocatello Resource Area, August - September 1997.
- Klara Varga (1997) - eastern portion of Caribou National Forest, August - September 1997.
- Edna Rey-Vizgirdas and others - selected areas of the Caribou National Forest, August 1997.
- Duane Atwood (1997) and others - Malad Ranger District, Caribou National Forest, August 1997.
- TRC Mariah Associates, Inc. (1997) - lower Sage Creek canyon, Caribou National Forest, August 1997.
- John Shelly - several proposed ITD road projects in south-central Idaho, August - September 1997.
- Seth Phalen (1997) - Basin Creek Bridge project area, Salmon River, August 1997.
- Calypso Consulting - Pacific Corp project areas along the Bear River, August 1997.

HABITAT

I used several references for characterizing the rangewide habitat for Ute ladies tresses, cited here once to eliminate redundancy in the descriptions below: U.S. Fish and Wildlife Service (1995; 1998), Ute Ladies Tresses Recovery Team (1995); and Heidel (1998). These should be referred to for greater detail. In addition, the state Heritage Program botanists can be consulted for habitat descriptions at each occurrence within their state. They are also good sources for up-to-

date status information in each state. The Idaho habitat descriptions build upon my previous reports (Moseley 1997a; 1997c; 1997g).

Macro-scale characteristics: It is useful to view the distribution of Ute ladies tresses in the context of large-scale ecological patterns, that is, ecosystems of regional extent or *ecoregions*. Bailey (1995) has devised an ecoregional classification where ecoregions are differentiated according to a hierarchical scheme using climate and vegetation as indicators of the extent of each unit. The two broadest levels of the hierarchy, *domain* and *division*, are defined by large ecological climate zones. *Ecoregions* (also called provinces) are subdivisions of *divisions* based on vegetational macro-features, which express more refined climatic differences. Mountains exhibiting altitudinal zonation are distinguished as separate ecoregions from surrounding lowlands having a similar climatic regime. Below are the ecoregional categories for the rangewide and Idaho distributions of Ute ladies tresses. Refer to Bailey (1995) for a map and detailed descriptions of these units.

In addition to ecoregions, it is also useful to understand the distribution of Ute ladies tresses in the context of broad-scale life zones, usually expressed as vegetation zones (e.g., Daubenmire 1943; Barbour and Billings 1988). These are also reviewed for the rangewide and Idaho distributions of Ute ladies tresses.

Rangewide:

All known populations of Ute ladies tresses generally occur below the coniferous forest vegetation zone. The populations are within steppe, shrub-steppe, or pinyon-juniper woodland zones. Occasionally, populations occur at or near lower timberline, the transition between coniferous forest and nonforest or woodland vegetation.

In terms of ecoregional considerations, all populations of Ute ladies tresses occur in the Dry Domain (Bailey's code 300), which features a dry climate where the annual losses of water through evaporation exceed annual water gains from precipitation. It occurs in four divisions and seven ecoregions, as follows (Bailey's hierarchial codes precede the names):

300 Dry Domain
- 330 Temperate Steppe Division
  - 331 Great Plains-Palouse Dry Steppe Ecoregion - *Nebraska, Wyoming, and Colorado Front Range populations.*

- M330 Temperate Steppe Regime Mountains
  - M331 Southern Rocky Mountains Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Ecoregion - *some Idaho, Utah, and northeastern Colorado populations.*
  - M332 Middle Rocky Mountains Steppe-Coniferous Forest-Alpine Meadow Ecoregion - *Montana populations.*

M333 Northern Rocky Mountains Forest-Steppe-Coniferous Forest-Alpine Meadow Ecoregion - *Washington population.*

340 Temperate Desert Division
341 Intermountain Semidesert and Desert Ecoregion - *some Utah and the historical Nevada populations.*
342 Intermountain Semidesert Ecoregion - *some Idaho populations.*

M340 Temperate Desert Regime Mountains
M341 Nevada-Utah Mountains Semidesert-Coniferous Forest-Alpine Meadow Ecoregion - *some Utah populations.*

Idaho:

Sagebrush-steppe is the predominant vegetation zone along the occupied stretch river. There is a narrow band of juniper woodlands (*Juniperus scopulorum* and possibly *J. osteosperma*) adjacent to the river on southerly slopes below Heise. Above Heise, the Snake River flows through the transition zone between forest and nonforest, with isolated stands of Douglas-fir *(Pseudotsuga menziesii*), big-tooth maple (*Acer grandidentatum*), and aspen (*Populus tremuloides*) occurring on northerly aspects.

Idaho populations occur in two ecoregions, Intermountain Semidesert (342) and Southern Rocky Mountains (M331). The 49-mile segment of the Snake River containing the populations transcends these two ecoregions, with Heise being on the boundary. In other words, the Snake River exits the Rocky Mountains at Heise and begins its journey across the Snake River Plain.

Meso-scale characteristics: In this section I describe general characteristics of Ute ladies tresses habitat such as geologic and floodplain features, soils, landscape setting, plant communities, and broad hydrologic gradients.

Rangewide:

In the meso-scale sense, Ute ladies tresses is a species of the lowlands. It occurs on plains, in broad intermontane valleys, and in narrow mountain valleys, generally at lower elevations relative to the surrounding landscape. While the absolute elevation of populations varies widely, from 1,800 feet in the Okanogan Valley to 6,800 feet in the Uinta Mountains, the relative position of these sites is low.

In the Rocky Mountains and Intermountain regions, most populations are in valley bottoms along medium to large streams and rivers of moderate gradient (not slow and meandering), generally as they near the edge of the mountains or somewhat out onto the plains, but before they start to slow down. It can also be found in meadows and irrigated pastures, isolated from rivers and streams. Hydrologically, the populations are subirrigated from groundwater that is tied to adjacent stream systems, as well as more stable water sources, such as springs and lakes.

Communities occupied by Ute ladies tresses are generally characterized as herbaceous (usually graminoid) wet meadows, irrigated pastures, riparian shrublands, and riparian deciduous forests. See the references listed above for detailed characterizations of communities occupied in each state. Heidel (1998) has detailed soils and vegetation data from Montana habitats, which are very different from Idaho habitats.

Idaho:

The 49-mile segment of the Snake River occupied by Ute ladies tresses has an overall gradient of about 0.2% and a relatively broad floodplain dominated by narrow-leaf cottonwood (*Populus angustifolia*) forests. This is a very dynamic system, where episodic flood events and subsequent river channel migration creates a shifting mosaic of communities and habitats on the floodplain. This scenario was more prevalent prior to the construction of Palisades Dam in 1956, which has eliminated most large floods (Merigliano 1996a). The specific epithet of Ute ladies tresses, *diluvialis*, is Latin meaning "of the flood" (Sheviak 1984) and is very descriptive of its habitat along the Snake River.

Two occupied river segments can be differentiated based on floodplain characteristics and they coincide with the boundary of the two ecoregions discusses in a pervious section. The 18-mile long segment below Heise is in the Intermountain Semidesert Ecoregion (342*)*. The floodplain is relatively wide as it spreads out onto the Snake River Plain, and has extensive channels, sloughs, islands, and large bars. In fact, it spread out too much for people living in the floodplain and the river is now confined between levees that parallel this segment along most of its length. Six of the 20 occurrences known for Ute ladies tresses in Idaho occur in this segment. I observed very little potential habitat along this stretch, and most of the places where potential habitat was observed, we found Ute ladies tresses.

The 31-mile long segment above Heise is in the Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Ecoregion (M331). The Snake River flows through a relatively narrow valley and canyon, surrounded by mountainous terrain instead of a volcanic plain. The floodplain is much narrower than below, but still has many complex floodplain features such as channels, sloughs, islands, and terraces. Fourteen of the 20 occurrences known for Ute ladies tresses in Idaho occur in this segment. This upstream segment is *THE* hotbed for Ute ladies tresses in Idaho, especially the stretch between Wolverine and Squaw creeks, where many population occur and much potential habitat exists (Moseley 1997c).

All Ute ladies tresses populations occur on alluvial deposits, ranging from very coarse cobbles to finer-textured sands and possibly sandy loams. The soils are classified primarily as Xeric Torrifluvents, which have mildly alkaline surface and subsurface layers (Miles 1981). The alluvial deposits are of mixed geologic origin, with a variety of bedrock types, including sedimentary, volcanic, and metamorphic rocks, occurring in the 5,752 square-mile discharge area above the Heise Gauge. See Merigliano (1996a) for a detailed discussion of the physical environment of this Snake River segment and its relationship to riparian vegetation and plants.